



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/604,367	07/15/2003	Edward Crandal Cooney, III	BUR920020066US2	1366
24241	7590	04/15/2005	EXAMINER	
IBM MICROELECTRONICS			VINH, LAN	
INTELLECTUAL PROPERTY LAW			ART UNIT	
1000 RIVER STREET			PAPER NUMBER	
972 E			1765	
ESSEX JUNCTION, VT 05452			DATE MAILED: 04/15/2005	

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/604,367

Applicant(s)

COONEY, III ET AL.

Examiner

Lan Vinh

Art Unit

1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 July 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-24 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 030204.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
 2. Ascertaining the differences between the prior art and the claims at issue.
 3. Resolving the level of ordinary skill in the pertinent art.
 4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
2. Claims 1-4, 6-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gupta et al (US 6,020,035) in view of Singh et al (US 6,776,851)

Gupta discloses a method of reducing the level of contaminations in a plasma processing chamber. The method comprises the steps of:

flowing an etchant into the etch chamber having a wafer/workpiece (col 10, lines 61-63), the work piece having one element that form a first layer of reaction products during said etch step that partially adhere to said inner chamber walls (col 10, lines 64-66)

introducing a species of oxygen and TEOS into said etch chamber to form a layer that covers the contaminant/reaction product (col 11, lines 12-29, abstract), which

Art Unit: 1765

reads on introducing a species of oxygen and silicon into said etch chamber that increases the adhesion of said first layer of reaction products to said inner chamber walls

Unlike the instant claimed invention as per claim 1, Gupta fails to specifically disclose etching a work piece in the etching chamber

Singh discloses a method for cleaning chamber comprises the step of etching a work piece in the etching chamber to form residue deposit in the chamber (col 5, lines 33-36)

Since, Gupta discloses flowing an etchant into the etch chamber having a wafer forming a first layer of reaction products in the chamber, one skilled in the art at the time the invention was made would have found it obvious to modify Gupta by adding the step of etching a work piece in the etching chamber in view of Singh teaching because Singh discloses that as a result of an etching operation deposition are formed in the chamber (col 5, lines 33-35)

Regarding claim 2, Gupta discloses forming a seasoning layer/second layer on the contaminant/first layer (see abstract)

Regarding claims 3-4, Gupta discloses flowing argon into a pressure reaction chamber (col 9, lines 18-20), which reads on flowing sputter etchant into a vacuum chamber

Regarding claim 6, Gupta discloses using the semiconductor wafer in the chamber (col 14, lines 5-6)

Regarding claims 7-8, Gupta discloses forming a low-k dielectric (col 14, lines 33-35)

The limitation of claim 9 has been discussed above

Regarding claims 10-12, Gupta discloses using a ring 12 of aluminum to support the wafer (col 6, lines 8-10)

Art Unit: 1765

Regarding claim 13, Gupta discloses that the seasoning layer covers portion of the residue such that the residue is not released during subsequent step/increasing the adhesion (col 10, lines 65-67)

3. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gupta et al (US 6,020,035) in view of Singh et al (US 6,776,851) and further in view of Oechsner (US 5,017,835)

Gupta as modified by Singh has been discussed above. Unlike the instant claimed invention as per claim 5, Gupta and Singh fail to disclose that the inner chamber comprises quartz

Oeschner, in a method for generating plasma, discloses that the inner plasma chamber comprises quartz (col 7, lines 15-20)

Thus, one skilled in the art at the time the invention was made would have found it obvious to modify Gupta and Singh by using a plasma chamber comprises quartz in view of Oeschner teaching because Oeschner discloses that the entire of the plasma vessel can likewise be made of an insulating material such as quartz (col 7, lines 16-19)

4. Claims 14-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gupta et al (US 6,020,035) in view of Singh et al (US 6,776,851) and further in view of Collins et al (US 6,814,814)

Gupta as modified by Singh has been discussed above. Regarding claim 14, Gupta also discloses the step of removing the wafer from the chamber (col 14, lines 10-12).

Art Unit: 1765

Unlike the instant claimed invention as per claims 14-17, Gupta and Singh fail to disclose the step of providing a substrate comprises a layer of silicon dioxide in the etch chamber and etching the substrate to produce silicon and oxygen

Collins discloses a method for cleaning residue from surfaces in a chamber comprises the step of providing a substrate comprises a layer of silicon dioxide in the etch chamber and etching the substrate to produce silicon and oxygen (col 5, lines 50-63, col 6, lines 50-55)

Thus, one skilled in the art at the time the invention was made would have found it obvious to modify Gupta and Singh by adding the step of providing a substrate comprises a layer of silicon dioxide in the etch chamber and etching the substrate to produce silicon and oxygen as per Collins because Collins discloses that the sputtered silicon species and sputtering gas may react with residue to form volatile species which are then exhausted from the chamber (col 6, lines 56-59)

5. Claims 18-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gupta et al (US 6,020,035) in view of Singh et al (US 6,776,851) and further in view of Collins et al (US 6,814,814)

Gupta discloses a method of reducing the level of contaminations in a plasma processing chamber. The method comprises the steps of:

providing a wafer/ first substrate having a low-k dielectric in a chamber (col 14, lines 33-35), flowing argon/sputter gas into the chamber (col 9, lines 18-19)

flowing an etchant into the chamber (col 10, lines 61-63)

Art Unit: 1765

removing the wafer from the chamber/sputter etch chamber (col 14, lines 10-12)
introducing a species of oxygen and TEOS into said etch chamber to form a
layer/second layer that covers the contaminant/reaction product/increase the adhesion
of the contaminant (col 11, lines 12-29, abstract)

Unlike the instant claimed invention as per claims 18, 21, Gupta fails to specifically
disclose etching a portion of the low-k dielectric, wherein a first layer comprising carbon
partially adheres to the inner chamber wall

Singh discloses a method for cleaning chamber comprises the step of etching a work
piece in the etching chamber to form carbon based residue deposit in the chamber (col
5, lines 20-36)

Since Gupta discloses flowing an etchant into the etch chamber having a wafer
forming a first layer of reaction products in the chamber, one skilled in the art at the time
the invention was made would have found it obvious to modify Gupta by adding the step
of etching a work piece in the etching chamber in view of Singh teaching because Singh
discloses that as a result of an etching operation deposition are formed in the chamber
(col 5, lines 33-35)

Gupta and Singh also fail to disclose providing a second substrate comprises a layer
of silicon dioxide in the etch chamber and etching the substrate to produce silicon and
oxygen as required in claims 18, 21

Collins discloses a method for cleaning residue from surfaces in a chamber comprises
the step of providing a substrate comprises a layer of silicon dioxide in the etch

Art Unit: 1765

chamber and etching the substrate to produce silicon and oxygen (col 5, lines 50-63, col 6, lines 50-55)

Thus, one skilled in the art at the time the invention was made would have found it obvious to modify Gupta and Singh by adding the step of providing a substrate comprises a layer of silicon dioxide in the etch chamber and etching the substrate to produce silicon and oxygen as per Collins because Collins discloses that the sputtered silicon species and sputtering gas may react with residue to form volatile species which are then exhausted from the chamber (col 6, lines 56-59)

Claims 19, 24 are rejected under Gupta et al (US 6,020,035) in view of Singh et al (US 6,776,851) and further in view of Collins et al (US 6,814,814) and Oechsner (US 5,017,835) using the same ground of rejection as discussed in paragraph 3.

Regarding claims 22-23, Gupta discloses using a ring 12 of aluminum to support the wafer (col 6, lines 8-10)

Conclusion

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lan Vinh whose telephone number is 571 272 1471. The examiner can normally be reached on M-F 8:30-5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571 272 1465. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 1765

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



LV

April 12, 2005